tees, by rendering the room liable to fire within. A party going into the place with a candle or lamp, as must always be the case, on account of the total exclusion of light, might drop a spark among any loose papers, and, the door being shut, the current for ventilation might possibly fan it into a flame, and the whole contents be consumed. To guard against this, the sides of the room have been fitted up with ranges of iron shelves, supported by iron pillars, and to occupy these shelves the trustees have fireproof iron safes, in which to deposit the title-deeds, books, and vouchers.

OBSERVATIONS ON DESIGN.

SIR,—Design, in its plainest sense, may be considered as a creative faculty, acquired by copying simple forms. The study is as unlimited as nature, and not confined to any particular sphere or region. Want of means and opportunity may check the student's progress towards perfection; but whatever may be the prejudiced opinion of the world, there is no partiality in the bestowal of the endowment requisite for becoming eminent; whilst talent in the humblest grade is sometimes found equal to the most studied and refined, when combining members for the purpose of forming some great superstructure.

It is but falling back on the observations of others to state, that the greatest masters in the school of design were those whose works are marked with an astonishing degree of simplicity in construction; but it may be further noticed, that he who effects by some plain principle of science what takes in others a combination of complex forces, has made the greatest progress towards perfection. This simplicity can only be retained by keeping in view the unalterable laws of material, and making them subservient to the purpose. And in all instances where labour or solidity is wanting or thrown away, it must arise from aiming at unnecessary durability, or from ignorance of the detailed members into which every design must be subdivided.

As an example, man is the masterpiece of design in the world. The original intention is fully carried out, both as a whole and in the minutest section. It is impossible, according to our ideas of creative power, to introduce into so small a compass, composed of such fragile material, more action and force than a man is capable of exerting. The simplicity apparent in every movement is the consequence of perfect articulation; and the leverage and deflection of the members are all regulated by a general law. From the beginning he was a labourer, and toiled for his sustenance, combining within him all the strength suitable to his calling. By degrees he raised himself from the earth as a mere drudge, and, by transferring a portion of his own mechanism to metal and wood, learned to mentally direct what he before physically executed.

Our improvements in mechanical arts, our inventions, and our wonderful discoveries, are nothing more than segmental copies from ourselves, excepting that the motive power requires a complex arrangement, in consequence of the system being fragmentary; and it is very possible, since we have so far progressed in the knowledge and application of those forces, that we may still approximate to perfection, and ultimately bring the manual labour of the civilized world altogether within the range of machinery. Still, let the degree of perfection be what it may, it is nothing more than a copy forced on man by necessity, and therefore cannot take an exalted range as a section in the School of Design, notwithstanding which, we learn from our knowledge of the subject, that in order to progress with confidence, where the imagination may have its greatest license, we must not lose sight of first principles for an instant.

These fundamental axioms are learned by every person when first about to enter the field of construction; but they are not followed out subsequently. Can it be that our knowledge is so simple, that we may substitute ideas which shall safely supersede those pointed out by scholastic laws? We require ornament and convenience, which cannot always be reconciled with purity of construction; and though we quit for a moment what was established centuries ago, and confirmed in accuracy by the lapse of ages, we fancy we never wander so far as to render our designs inharmonious. Limited means suggest alterations, and it is prudent that economy should be practised either in a private or a national undertaking.

In this does the proof of ability consist. In producing perfection is true genius to be found. An ordinary architect may design a faultless specimen of construction, and carry out the same, as long as his means are not limited; but to introduce this purity of style and requisite convenience with niggardly economy, can only be achieved by the man of intrinsic judgment. As long as prejudice and chimera are the leading ideas in formations arising from the mind, we must not be surprised at any innovation forced upon us, however disproportioned or monstrous it may appear; yet must the world grieve that the architects of the Choragic monument and of the Wellington statue drew inspiration from the same source with such different results.

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RAILWAY JOTTINGS.

THE suggestion of a safe mode of raising and working such tubular bridges as are in course of construction at the Menai Straits and the Conway, is one, says a correspondent of the *Mechanics' Magazine*, that may save the pockets of the shareholders in the first instance, and the necks of enterprizing travellers in the last. Regarding the results of formulæ deduced from models in a case such as this to be fallacious, especially as regards vibration, as the most destructive element in all such railway works as bridges, viaducts, and even slopes and tunnels, he proposes, in an unprecedented experiment such as this, to keep on the safer, though less venturous and enterprising side of so untried a novelty, by erecting only one tube and one set of rails, and not only preventing two trains from ever meeting on such ticklish ground, but the locomotive head and front of all possible vibratory offence from ever accompanying a train on such an expedition. "I would suggest," he says "that the trains in each direction shall be drawn by stationary power, or even by rope machinery with revolving cylinders, so as to bring the driving-wheels of the locomotive over these cylinders and by the action of the engine (which being placed on a revolving cylinder could not progress), give motion to the rope machinery, and thus even save the expense of stationary power. By this arrangement, also, the stability of the structure, and the safety of the passengers, would not be endangered. The weight of the locomotive would not have to be borne by the tube, and the motion of the train would necessarily be so slow, as not to generate any destructive vibration. In adopting two tubes," he adds, "they cannot be any mutual help, unless they are attached to each other: if so attached, the combined effect of the vibration caused by the passing of trains in opposite directions may prove much more destructive than can be anticipated; and should it be said that it is not intended to allow two trains to pass each other on the bridge, it will then follow, as a matter of course, that one tube is as good as two for all useful purposes."——The amount of traffic for last week, on upwards of 3,227 miles of railway, says the *Railway Chronicle*, was 178,975*l.*, thus accounted for:—82,091*l.* for passengers, 47,998*l.* for goods, and 48,886*l.* for passengers and goods together; being an increase of 25,091*l.* over the corresponding week of last year, when the mileage was about 2,525.——Enormous quantities of fish are daily arriving in London from Ramsgate. Heavy fish trains reach the Bricklayers' Arms station of the South-Eastern Railway almost every morning, at an hour suited for delivery in Billingsgate market. During the last week, trains of nearly 30 trucks of fish have been thus received. "We believe," says the *Times*, "that this great increase is partly to be attributed to the increased energy of the fishermen, consequent on the facilities and advantages they derive from railway communication. The South-Eastern Railway are doing their best to encourage the trade. Let us hope that Ireland may take a lesson from the fishermen of Ramsgate, Broadstairs, Deal, and Dover." Ireland, however, has peculiar views of her own on this particular subject, as the ready reply of a native to the like recommendation,—"Sure you would not take all the fish out of the sea?"—sufficiently attests.——The other morning, says a contemporary, a novel scene took place at the Chelmsford Railway station—nothing less than the officers of justice marching on the line, with warrant in hand, and clutching a first class carriage, with the strong arm of the law, in payment of the sum of 31*l.* due for poor-rates to the parish of Margaretting. The directors, it seems, had imagined themselves aggrieved by the weight the overseers had laid upon them, and commenced an appeal at the last quarter-sessions, when it was thought the question was in a train for decision, but they suddenly stopped short and abandoned it, while still the cash was not forthcoming; so that nothing was left for it but a little compulsion.——The efforts of the Trent bridge contractors to find a firm foundation, says the *Lincolnshire Times*, have hitherto proved abortive. The works, we understand, have been let for the sum of 30,000*l.*, but from the enormous expense incurred already, and the great outlay yet required, there is every prospect of its costing considerably more than the estimate.——The High Tor tunnels at Matlock, on the Manchester, Matlock, and Ambergate line, are progressing. The tunnel nearest Matlock-bridge is completed for 80 yards; and at the south, or Matlock-bath end, 50 yards are finished, besides 28 yards of heading in the middle cutting. Between 30 and 40 yards of tunnelling have been cut during the last month, and the whole will probably be completed by August next. The still more difficult tunnel at Willersley is now being wrought at eight points at once, by the contractor, Mr. Harding.——The great tunnel under Liverpool is about the only one in connection with the London and North-Western system on which there are no particular appearances of suspension, the object being to connect as soon as possible, by a tunnel of 2¼ miles, the goods depôt at Edghill with the North Docks at the water's edge, where the bulk of all the foreign shipping centres. This is the 'Victoria Tunnel,' contracted for by Messrs. Holmes and M'Cormack, who have between 1,000 and 2,000 men at work on it, and have already carried the driftway half through. The operations are very dangerous, and in some places shake the foundations of the houses, which at many points are only at 50 to 80 feet above the level where the rails are to be laid, while, in other places, there is a variation of from 90 to 100 feet. This tunnel undermines in its course three or four places of worship, churches, Quakers' meeting-houses, and Baptist-chapels, which will be only 66 feet above the run of the locomotive. One-half the tunnel is good to work through, consisting of rock and sandstone; but as it approaches the locks, the soil is of a treacherous kind and rubbish. The railway company have to pay compensation to the owners of every house and building the tunnel passes under.——The operations at the Tweed viaduct and bridge, where the masons lately struck work, have hitherto been making rapid progress. Pile-driving has been going on for several months; a wooden communication has been established between the two sides of the river, and at each side large portions of the temporary wooden bridge have been erected, which, from their height and intricate construction, are said to have an imposing effect.——The contractors for the Beattock contract of the Caledonian line have eight of the drilling machines already noticed in THE BUILDER, at work on the lower part of their laborious summit cuttings. This machine consists of a ponderous rod sharpened at the lower end so as to form a round hole in the rock, and is alternately raised and depressed with great force by means of a driving-wheel, worked by eight men, a ninth attending generally to the machine, and keeping the drilling rod at a low temperature by a plentiful supply of water. In the evening, when the holes have been finished, they are charged with gunpowder, the machines removed, and a general blasting effected. The introduction of these machines, it is said, has facilitated operations very much. Though invented in America, the inventor, it seems, is an Englishman. For about a mile in length, to which it extends, by about 50 feet less or more in depth, this summit-cutting still employs 700 men, although several hundreds have been paid off; and the blasting process has consumed no less

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